GARLIC MUSTARD
(Alliaria petiolata)

Description: Garlic mustard, or hedge garlic, is a member of the Brassicaceae or mustard family. Garlic mustard is a biennial or winter annual that can mature from 1 to 4 feet in height. Stems of the plant are erect, slightly ridged, light green in color, hairless above and hairy below. The plant can grow as a single stem or as several stems from the same rootstock. First year plants consist of basal rosette leaves that are dark green in color and kidney shaped with coarsely toothed margins. Mature leaves are alternate, heart to triangular shaped with shallow to coarsely wavy toothed margins, 1 to 4 inches wide, and gradually reduce in size towards the top of the stem. Both leaves and stems of the plant emit a distinctive onion or garlic odor when crushed. As fall approaches the odor becomes milder. Flowers are terminal and consist of four separate petals that are white and tightly clustered. Fruits of the plant are siliques or thin pods that are four-sided, clustered, erect to ascending, and range in length from 1 to 5 inches. Siliques produce a single row of oblong, brownish-black seeds with ridged seed coats. The taproot of the plant is slender, white, and “s”-shaped at the top of the root.

Plant Images:
**Distribution and Habitat:** Garlic mustard is native to Europe. The plant is primarily found in damp, shaded soils. However, infestations are widespread and can occur on wet riverbanks as well as well-drained sandy soils. Garlic mustard is generally associated with calcareous soils and is intolerant of acidic substrates. Populations of the plant are commonly found in upland and floodplain forests, under forest canopies, forest margins, yards, along roadsides, and railway embankments. Garlic mustard is a species that is also highly adapted to areas that are subjected to continued or repeated disturbances, such as floodplains. The plant is shade tolerant, occurring in both partial and full shade.

**Life History/Ecology:** Garlic mustard is a cool-season biennial or winter annual forb. In North America, the plant is a strict biennial that produces a seedling and basal rosette the first year followed by a flowering stem the second year. Garlic mustard reproduces solely by seed production. Seedlings of the plant germinate in the spring, appearing between January and April. Plants that survive the winter will flower from April to June of the second growing season. Siliques are present by May and seeds begin to ripen and shed by June. Individual plants can produce 350 to 7,900 seeds. Seed production varies according to habitat conditions and seeds can remain viable in the seed bank for up to five years.

There have been reports of cattle producing poor tasting or tainted milk after grazing on garlic mustard rosettes.

**History of Introduction:** Garlic mustard is native to Europe and was introduced to North America in the 1800s for medicinal purposes and as a salad plant. The plant was first recorded in 1868, on Long Island, New York. Garlic mustard is now widely distributed in Canada and throughout the midwestern and northeastern United States. The plant is found south to Georgia and Arkansas, west to Kansas and North Dakota, and has also been reported in Utah, Colorado, Oregon, and Washington. Currently, there have been no reports of garlic mustard in North Dakota but there has been a historical report from Cass county.

**Effects of Invasion:** Garlic mustard grows in dense stands in semi-shaded and shaded areas. The plant is able to spread and quickly dominate understory habitats such as forests. Once garlic mustard enters an environment and becomes a permanent part of a community, populations of the plant tend to increase each year. As a result, garlic mustard can lower the native herbaceous diversity of an area by displacing desirable plant species. Allelopathic chemicals produced by the plant may interfere with growth of native plant species and microbes. The plant also alters habitats for rare, native insects, animals, amphibians, and birds. Garlic mustard is difficult to eradicate once established.

**Control:**
Management objectives for garlic mustard control should involve periodic monitoring of populations and preventing seed production. Seeds of garlic mustard can remain viable in the soil for five or more years; therefore, particular attention is required for several consecutive growing seasons to prevent germination of new plants. Control methods should be combined into an integrated management system for the best long-term control of the plant.

*Mechanical* - Hand pulling garlic mustard can be effective if the upper half of the root is removed to prevent a new flower stalk from forming. However, pulling may also cause a soil disturbance and lead to seeds being redistributed to an upper soil horizon resulting in an improved germination rate. Mowing may be an effective control measure but seeds of the plant may be widely distributed and flowering plants may be able to reproduce new flowering shoots. Prescribed burning has had variable control. Garlic mustard infestations may remain stable, increase, or decrease following the burn. In an eastern mesophytic forest understory in Kentucky, garlic mustard populations remained stable and had no
significant change after three consecutive years of dormant season burns. In northern Illinois, garlic mustard populations were kept at a low density following repeated annual prescribed burns that completely removed top growth. Following a spring prescribed burn, adult plants of garlic mustard resprouted from adventitious buds on the root crowns of the plants located below the soil surface. After a single fire, garlic mustard populations may increase due to survival of the adult plants and/or due to an enhanced seedling survival where seeds are able to germinate more readily following the removal of the litter layer. Therefore, three to five years of consecutive prescribed burns may be more successful.

**Chemical** - Infestations can be controlled by applying 1 - 2 percent active ingredient solution of glyphosate to foliage of garlic mustard in the fall or early spring. Glyphosate can have a successful control rate on the plant but may also result in a loss of native herbs or graminoids. Bentazon applied to garlic mustard during the growing season reduced rosette cover in one study and had minimal impact on native desirable species. However, bentazon is less effective on garlic mustard in some environments and has a high potential for groundwater contamination. A spring application of triclopyr amine may also control the plant.

Contact your local county extension agent for recommended use rates and locations.

**Biological** - There are approximately 69 insect species and 7 fungi associated with garlic mustard in Europe. Biological control agents are currently being researched in the United States. Four weevils are currently being investigated as potential control agents. Two shoot mining weevils, *Ceutorhynchus alliariae* and *Ceutorhynchus roberti*, mine shoots, petioles of rosettes, and bolting plants of garlic mustard. *Ceutorhynchus constrictus* is a univoltine weevil that feeds on garlic mustard seeds. *Ceutorhynchus scrobicollis* is a root mining weevil that feeds on the root crown when in the larvae stage. A flea beetle, *Phyllotreta ochripes*, is also being researched. There are no biocontrol agents available in North Dakota.

**References:**


Basal rosette and seed pod photographs courtesy of Chris Evans, University of Georgia (www.invasive.org).

Flower photograph courtesy of Jody Shrimp, Illinois Department of Natural Resources (www.invasive.org).